Departmental Websites of Central Government Ministries of India: a webometric study

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Abstract

To measure the visibility, performance, and link quality of departmental websites under central government ministries of India, the study looked at the websites of India's ministries' departments. The required data have been collected by applying web-based survey and observation methods. Different webometric tools and approaches have then been used to analyse and tabulate the collected data. The current study has examined the domain structure, number of webpages, and link pages of the existing departmental websites under different ministries of India. It has further calculated the simple web impact factor (WIF), the self-link WIF, and the external link WIF and ranked the websites based on the score of different WIFs. A link network diagram is also prepared which shows the links among the selected central government departmental websites. The study reveals that 89.47% of websites use gov.in extension and only 10.53% of websites carry nic.in domain extension. The website of Department of Food & Public Distribution (DoFPD) got the highest position with 196 link pages, only one web page and 196 Simple WIF. This study will assist in making guidelines for website development and be helpful to further research in the field of webometric evaluation.

Keywords: Central government departmental websites, Google page rank, Webometrics, Webometric evaluation, Web Impact Factor,

1. Introduction

It is a prerequisite for every administrative entity to make a website with the occurrence of Internet and Information and Communication Technology (ICT). An administrative body can use the least amount of effort and time by having a website to reach the greatest number of people. Having a personal, functional website is therefore essential for the administration. Additionally, even though its sub-bodies may be located in topographically dispersed locations, a site enables an administrative body to assemble all of its data. Therefore, integrating ICT into government organisations can result in the advancement of the executive branch. Governments of all countries make data accessible to citizens via a variety of channels to add a level of transparency, to emphasise responsibility, and bring their accomplishments to the attention of the general populace. Natives make decisions about the degree of certainty and success of governments using this information (Chand & Ramesha, 2017).

The words "web" and "metrics" are the roots of the term "webometrics". The web is described in the dictionary of science as a hypermedia system that enables users to see

and obtain information from documents that contain links. Metrics are systems of measurement, specifically evaluations of the validity and usefulness of digital resources. The analysis of web-related topics in a quantitative manner is called webometrics. It focuses on measuring various characteristics of the web, including websites, web pages, individual web page components, phrases inside web pages, etc. (Verma & Brahma, 2017).

2.   Review of literature

Experiments were conducted evaluating e-government websites' effectiveness, efficiency, and user satisfaction through usability testing and a new assessment framework (Darem, 2013). Six parameters were proposed for analysing Indian government websites, finding adherence to identifier guidelines but low scores in services and participation (Chand & Ramesha, 2017; Brooks & Persaud, 2015). The importance of service emphasised quality in e-government, highlighting its impact on citizen engagement and public administration (Bhattacharya, 2014). Past literature has extensively examined the usability and interaction of academic and government websites, particularly focusing on e-government services' performance. This study aims to analyse Indian central government ministry websites using webometric tools.

3.   Objectives of the study

The main research objectives are:

I.   to figure out the number of web pages, simple link pages, self-link pages, and external link pages on the websites of central government ministries' departments in India

ii.   to examine the effectiveness of links on Indian government departmental websites

iii. to locate and classify the domain names of India's central government departments' websites

iv.   to find out the websites' online Impact Factors

v.   to rank the concerned websites under study according to different Web Impact Factors.

4.   Scope of the study

As per the information presented by the integrated government online directory of India (https://igod.gov.in/), there are 52 central government ministries, of which 19 ministries have their department/ departments. These ministries' departments are 52 in total number and they are accountable for performing different activities under their parent ministries. The departmental websites with separate domain names have been included in this study; that's why the study covers only 38 departmental websites.

5.   Methodology

The required data have been collected by applying web-based survey and observation techniques, from the selected departmental websites. In the next stage, different webometric tools and approaches have been used to analyse and tabulate the collected data. The total number of pages from each website was counted using the Google search engine; the chosen search term was, site : url of the website for instance, site: https://dare.gov.in/

Website Link Analyzer (https://small seotools.com/website-link-analyzer-tool/) has been used to extract simple links, self or internal links and external links from every department's website under study.

6. Web Impact Factor (WIF)

The Web Impact Factor is a tool for evaluating the value of websites based on the links that point to them. The number of webpages and links to a website are necessary for calculating WIF. The concerned study uses three different kinds of WIFs, which are described below:

Simple-WIF = No of Linked Pages/ No of webpages - reported by the search engine Google

External Link-WIF = No of External Linked Pages/ No of webpages - reported by the search engine Google

Self Link-WIF = No of Self-Linked Pages/ No of webpages - reported by the search engine Google

(Hadagali, Bulla &Shettar, 2021).

Table 1: List of ministries' departments with their website addresses

Sl. No.	Central government ministries' departments	Website address
1	Department of Administrative Reforms & Public Grievances (DoARPG)	https://darpg.gov.in/en
2	Department of Agriculture & Farmers Welfare (DoAFW)	https://agricoop.nic.in/en
3	Department of Agricultural Research and Education (DoARE)	https://dare.gov.in/
4	Department of Animal Husbandry and Dairying (DoAHD)	https://dahd.nic.in/
5	Department of Biotechnology (DoB)	https://dbtindia.gov.in/
6	Department of Chemicals and Petrochemicals (DoCPC)	https://chemicals.gov.in/
7	Department of Commerce (DoC)	https://commerce.gov.in/
8	Department of Consumer Affairs (DoCA)	https://consumeraffairs.nic.in/
9	Department of Defence Production (DoDP)	https://www.ddpmod.gov.in/
10	Department of Drinking Water and Sanitation (DoDWS)	https://jalshakti-ddws.gov.in/en
11	Department of Economic Affairs (DoEA)	https://dea.gov.in/
12	Department of Empowerment of Persons with Disabilities (DoEPD)	https://disabilityaffairs.gov.in//content/
13	Department of Expenditure (DoE)	https://doe.gov.in/
14	Department of Ex-servicemen Welfare (DoEW)	https://www.desw.gov.in/
15	Department of Fertilizers (DoFz)	https://www.fert.nic.in/
16	Department of Financial Services (DoFS)	https://financialservices.gov.in/
17	Department of Fisheries (DoF)	https://dof.gov.in/

Sl. No.	Central government ministries' departments	Website address
18	Department of Food & Public Distribution (DoFPD)	https://dfpd.gov.in/index.htm
19	Department of Health Research (DoHR)	https://dhr.gov.in/
20	Department of Investment and Public Asset Management (DoIPAM)	https://dipam.gov.in/
21	Department of Justice (DoJ)	https://doj.gov.in/
22	Department of Land Resources (DoLR)	https://dolr.gov.in/
23	Department of Legal Affairs (DoLA)	https://legalaffairs.gov.in/
24	Department of Official Language (DoOL)	https://rajbhasha.gov.in/
25	Department of Pension & Pensioners' Welfare (DoPPW)	https://doppw.gov.in/en
26	Department of Personnel & Training (DoPT)	https://dopt.gov.in/#
27	Department of Pharmaceuticals (DoPh)	https://pharmaceuticals.gov.in/
28	Department of Posts (DoP)	https://www.indiapost.gov.in/vas/Pages/IndiaPostHome.aspx
29	Department for Promotion of Industry and Internal Trade (DPIIT)	https://dpiit.gov.in/
30	Department of Public Enterprises (DoPE)	https://dpe.gov.in/
31	Department of Revenue (DoR)	https://dor.gov.in/
32	Department of School Education & Literacy (DoSEL)	https://dsel.education.gov.in/
33	Department of Science & Technology (DoST)	https://dst.gov.in/
34	Department of Scientific and Industrial Research (DoSIR)	http://www.dsir.gov.in/

7. Analysis and interpretation of data

7.1 *Distribution of departments' websites by domain*

A domain name consists of the name of a website and the specific domain extension.

Table 2: Websites using specific domain extensions

Domain names	Number of government departmental websites	Percentage (%)
gov.in	34	89.47
nic.in	04	10.53

Table 2 depicts the distribution of domains among central government departmental websites of India. It exhibits that two types of domain name (i.e. gov.in and nic.in) have been used by the concerned websites. 34 (89.47%) departmental websites use the domain gov.in whereas only 4 (10.53%) websites follow nic.in extension.

7.2 *Simple WIF of departmental websites*

Table 3 displays the Simple Web Impact Factor. It displays the link pages for departmental websites together with their rank distribution as per Simple WIF. The score of Simple WIF (B/A) of each website is taken by dividing the number of link pages (B) by total number of web pages (A) of a website.

Table 3: Simple WIF of departmental websites

Sl. No.	Name of Departmental Websites	Number of web Pages (A)	Number of Link pages (B)	Simple WIF (B/A)	Rank by Simple WIF
1	DoFPD	01	196	196	01
2	DoP	02	108	54	02
3	DoPPW	127	99	0.779	03
4	DoARPG	428	182	0.425	04
5	DoIPAM	557	187	0.335	05
6	DoDP	708	125	0.176	06
7	DoJ	1710	263	0.153	07
8	DoWRRDGR	2140	292	0.136	08
9	DoC	5400	567	0.105	09
10	DoF	2130	200	0.093	10
11	DoSJE	2020	169	0.083	11
12	DoSEL	2390	169	0.070	12
13	DoSIR	3250	214	0.065	13
14	DoFz	2690	172	0.063	14
15	DoPT	550	352	0.063	14
16	DoB	4180	235	0.056	15
17	DoAFW	3400	188	0.055	16
18	DoEW	3200	133	0.041	17
19	DoCPC	4350	177	0.040	18
20	DoR	3680	140	0.038	19
21	DoE	8080	173	0.021	20
22	DoPh	6510	130	0.019	21
23	DoEA	8910	167	0.018	22
24	DoFS	7120	133	0.018	22
25	DoST	9760	179	0.018	22
26	DoPE	11600	201	0.017	23
27	DoAHD	9810	144	0.014	24
28	DoDWS	71	01	0.014	24
29	DoLR	11300	141	0.012	25
30	DoCA	63000	690	0.010	26
31	DoOL	11200	118	0.010	26
32	DoLA	14000	125	0.008	27
33	DPIIT	24700	209	0.008	27
34	LD	13200	108	0.008	27
35	DoT	75100	338	0.004	28
36	DoHR	1290	NF	--	--
37	DoARE	1150	NF	--	--
38	DoEPD	NF	236	--	--

Table 3 shows that the website of DoFPD got the highest position with 196 link pages, only one web page and 196 Simple WIF. Second rank has been occupied by DoP with 108 link pages, 2 web pages and 54 Simple WIF. The website of DoPPW secured 3rd rank with 99 link pages, 127 web pages and 0.779 Simple WIF. Fourth and fifth rank has been taken by the website of DoARPG and DoIPAM with 0.425 and 0.335 Simple WIF respectively. DoF has got 10th position with 0.093 Simple WIF. The websites of DoFz and DoPT have got 14th rank with a score of 0.063. 22nd position is occupied by the websites of three departments- DoEA, DoFS and DoST with 0.018 Simple WIF. The websites of DoAHD and DoDWS have been placed in 24th position with a score of 0.014.

Three websites, DoLA, DPIIT and LD have got 27th rank with a score of 0.008. The website of DoT is placed in the last position with 338 link pages, 75100 webpages and 0.004 Simple WIF.

7.3 *External link WIF of departmental websites*

Table 4 displays External Link WIF of departmental websites. Here, A and C stand for the websites' number of total web pages and total number of externally linked web pages, respectively. The score of External Link WIF (C/A) for each website is derived by dividing the entire number of externally linked web pages (C) by the number of total web pages (A).

Table 4: External link WIF of departmental websites

Sl. No.	Name of Departmental Websites	Number of Web pages (A)	Number of External Linked Web pages (C)	External Link WIF (C/A)	Rank by External link WIF
1	DoFPD	01	33	33	01
2	DoP	02	13	6.5	02
3	DoPPW	127	52	0.409	03
4	DoARPG	428	44	0.102	04
5	DoJ	1710	121	0.070	05
6	DoDP	708	31	0.043	06
7	DoSJE	2020	57	0.028	07
8	DoPT	5550	145	0.026	08
9	DoF	2130	51	0.023	09
10	DoWRRDGR	2140	49	0.022	10
11	DoSEL	2390	48	0.020	11
12	DoAFW	3400	55	0.016	12
13	DoB	4180	53	0.012	13
14	DoC	5400	68	0.012	13
15	DoEW	3200	38	0.011	14
16	DoR	3680	43	0.011	14
17	DoSIR	3250	31	0.009	15
18	DoCPC	4350	38	0.008	16
19	DoCA	63000	497	0.007	17
20	DoEA	8910	45	0.005	18
21	DoFS	7120	41	0.005	18
22	DoIPAM	557	03	0.005	18
23	DoAHD	9810	43	0.004	19
24	DoPE	11600	57	0.004	19

Sl. No.	Name of Departmental Websites	Number of Web pages (A)	Number of External Linked Web pages (C)	External Link WIF (C/A)	Rank by External link WIF
25	DoPh	6510	30	0.004	19
26	DoE	8080	27	0.003	20
27	DoLR	11300	39	0.003	20
28	DoST	9760	39	0.003	20
29	DoFz	2690	07	0.002	21
30	DoLA	14000	39	0.002	21
31	DoOL	11200	31	0.002	21
32	DPIIT	24700	51	0.002	21
33	LD	13200	27	0.002	21
34	DoT	75100	101	0.001	22
35	DoHR	1290	NF	--	--
36	DoARE	1150	NF	--	--
37	DoDWS	71	NF	--	--
38	DoEPD	NF	42	--	--

The External link WIFs of all central government departmental websites in this study have been depicted in table 4. The websites are ranked based on their scores. The website of DoFPD has taken the first rank with 1 web page, 33 external linked web pages and 33 External link WIF. Second rank is taken by the website of DoP with 2 web pages, 13 external linked web pages and 6.5 External link WIF. Third and fourth positions have been occupied by the websites of DoPPW and DoARPG with 0.409 and 0.102 External link WIFs respectively. The websites of two departments, DoB and DoC got 13th position with 0.012 External link WIF. The websites of DoEA, DoFS and DoIPAM occupy 18th rank with 0.005 External link WIF. Twenty first position is occupied by the websites of five departments - DoFz, DoLA, DoOL, DPIIT and LD with 0.002 External link WIF. The website of DoT has been placed in last rank i.e. 22nd with 75100 web pages, 101 external linked web pages and 0.001 External link WIF.

7.4 Self link WIF of departmental websites

Table 5 exhibits the individual score and rank (based on Self Link WIF) of each departmental website under study. In this table, A denotes a total number of web pages, and D denotes a total number of self-linked web pages inside the websites. The score of Self link WIF of each website is retrieved by dividing the number of self-linked web pages (D) by a number of web pages (A). Websitesare rated as per the scores of Self link WIFs.

Table 5: Self link WIF of departmental websites

Sl. No.	Name of Departmental Websites	Number of Web pages (A)	Number of Self linked web pages (D)	Self-link WIF (D/A)	Rank by Self Link WIF
1	DoFPD	01	163	163	01
2	DoP	02	95	47.5	02
3	DoPPW	127	47	0.370	03
4	DoIPAM	557	184	0.330	04
5	DoARPG	428	138	0.322	05
6	DoDP	708	94	0.132	06
7	DoWRRDGR	2140	243	0.113	07
8	DoC	5400	499	0.092	08
9	DoJ	1710	142	0.083	09
10	DoF	2130	149	0.069	10
11	DoFz	2690	165	0.061	11
12	DoSIR	3250	183	0.056	12
13	DoSJE	2020	112	0.055	13
14	DoSEL	2390	121	0.050	14
15	DoB	4180	182	0.043	15
16	DoAFW	3400	133	0.039	16
17	DoPT	5550	207	0.037	17
18	DoCPC	4350	139	0.031	18
19	DoEW	3200	95	0.029	19
20	DoR	3680	97	0.026	20
21	DoE	8080	146	0.018	21
22	DoPh	6510	100	0.015	22
23	DoDWS	71	01	0.014	23
24	DoST	9760	140	0.014	23
25	DoEA	8910	122	0.013	24
26	DoFS	7120	92	0.012	25
27	DoPE	11600	144	0.012	25
28	DoAHD	9810	101	0.010	26
29	DoLR	11300	102	0.009	27
30	DoOL	11200	87	0.007	28
31	DoLA	14000	86	0.006	29
32	DPIIT	24700	158	0.006	29
33	LD	13200	81	0.006	29
34	DoCA	63000	193	0.003	30
35	DoT	75100	237	0.003	30
36	DoHR	1290	NF	--	--
37	DoARE	1150	NF	--	--
38	DoEPD	NF	194	--	--

Table 5 exhibits the Self link WIFs of the departmental websites with their ranks. It is showing that the website of DoFPD occupies the first rank with 1 web page, 163 Self linked web pages and 163 Self link WIF. DoP and DoPPW have been placed in second and third position with 47.5 and 0.370 Self link WIFs respectively. The fifth rank is taken by DoARPG with 428 web pages, 138 Self linked web pages and 0.322 Self link WIF. The website of DoF gets tenth rank with 2130 web pages, 149 Self linked web pages and 0.069 Self link WIF. Twenty third position is occupied by the websites of DoDWS and DoST with 0.014 Self link WIF. The websites of DoLA, DPIIT and LD got 29th rank with

0.006 Self link WIF. The lowest rank is taken by the websites of DoCA and DoT with 0.003 Self link WIF.

7.5 *Google's page rank and domain authority*

Google uses the Page Rank algorithm to rank the webpages of various websites in their search engine results. Through the use of this method, website page importance can be determined.

A site's performance in search engine results can be determined by its domain authority, a factor in search engine rankings. It provides a general summary of anticipated search engine performance and was developed by the software development company Moz. It assigns websites a score between 1 and 100, with the higher number indicating a better result.

Table 6: Domain authority, page authority and page rank of departmental websites

Sl. No.	Name of Departmental Websites	Domain Authority	Page Authority	Page Rank (out of 10)
1	DoAFW	53	58	06
2	DoP	59	58	06
3	DoST	57	56	06
4	DoT	58	54	06
5	DoAHD	47	50	05
6	DoB	47	47	05
7	DoC	51	52	05
8	DoCA	48	47	05
9	DoEA	49	48	05
10	DoFS	42	51	05
11	DoPT	42	48	05
12	DoSEL	60	42	05
13	LD	51	48	05
14	DoARPG	35	45	04
15	DoDP	34	41	04
16	DoDWS	38	43	04
17	DoE	41	44	04
18	DoEPD	42	43	04
19	DoEW	38	41	04
20	DoF	33	42	04
21	DoFPD	44	41	04
22	DoFz	34	44	04
23	DoHR	35	42	04
24	DoIPAM	37	40	04
25	DoJ	41	45	04
26	DoLA	36	42	04
27	DoLR	32	39	04
28	DoOL	33	45	04
29	DoPE	37	43	04

Sl. No.	Name of Departmental Websites	Domain Authority	Page Authority	Page Rank (out of 10)
30	DoPh	38	43	04
31	DoR	40	47	04
32	DoSIR	35	40	04
33	DoSJE	32	39	04
34	DoWRRDGR	36	41	04
35	DPIIT	38	45	04
36	DoARE	26	28	03
37	DoCPC	22	28	03
38	DoPPW	28	38	03

Table 6 highlights the score of individual departmental websites under Domain Authority, Page Authority and Google's Page Rank. The highest score i.e. 60 according to Domain Authority has been occupied by the website of DoSEL. The websites of DoAFW and DoP secured the highest score 58 under Page Authority. According to Google's Page Rank, the top score i.e. 6 is taken by the websites of DoAFW, DoP, DoST and DoT.

7.6 *Link mapping of websites*

The popular website link analyser, smallseotools (https://smallseotools.com/website-link-analyzer-tool/) has been utilised to gather required data from the selected central government departmental websites of India.The task of web harvesting was conducted from 11th - 13th July, 2023. Well-knowngraph visualisation software Graph Viz has been used in this study for making link network diagrams of the selected websites under study. Figure1 represents the network diagram which shows links (mainly external links) among 24 departmental websites. This diagram exhibits that the website, DoPE (https://dpe.gov.in) is connected with a large number of departmental websites. It is linked with DoC, LD, DoIPAM, DoE, DoEA and DoPT. DoE (https://doe.gov.in/) is linked with four websites i.e. DoEA, DoFS, DoIPAM and DoR. Consequently, a joint initiative among central government departmental websites of India attracts users to search and retrieve more information according to their demand.
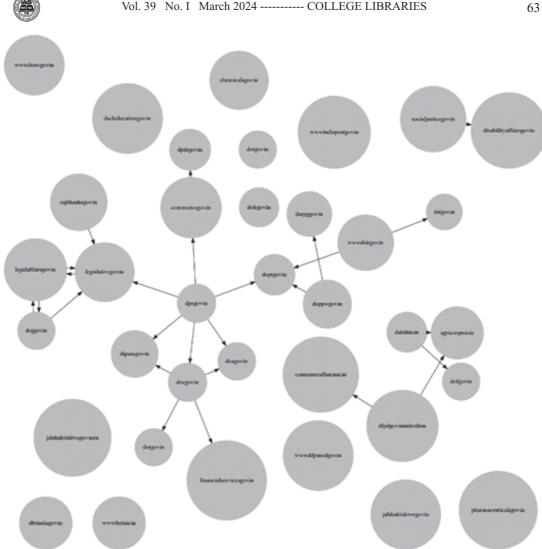
Figure 1: Mapping of departmental websites (GraphViz)

8.   Discussion

The study presents several significant findings regarding the web presence and connectivity of Indian central government ministry websites. It highlights the dominance of the gov.in extension, with a mere 10.53% utilising the nic.in domain extension. Notably, the Department of Food and Public Distribution (DoFPD) emerges prominently, securing top ranks across various metrics, including link pages, self-linked web pages, and Domain Authority score. Additionally, the Department of School Education and Literacy (DoSEL) achieves the highest Domain Authority score, while the Department of Agriculture, Cooperation & Farmers Welfare (DoAFW) and the Department of Personnel & Training (DoP) excel in Page Authority and Google Page Rank. Furthermore, the network diagram

underscores the interconnectedness of certain websites, with the Department of Public Enterprises (DoPE) serving as a central hub, linked to multiple departmental websites, facilitating information exchange and collaboration within the government ecosystem. However, the findings also raise questions regarding the disparity in web presence and connectivity among different departments, suggesting areas for improvement in enhancing online visibility and interdepartmental collaboration.

9.   Suggestions

- To make the concerned websites searchable via search engines, basic search engine optimisation (SEO) principles of big search engines should be adhered to;

- There shouldn't be any broken links on the departmental websites;

- To make it simpler for users to obtain the information supplied by departments, departmental websites with fewer webpages must improve the number of webpages indexed by search engines.

- So that search engines may quickly access and index the most recent content posted to the websites, the web design and links between the pages need to be corrected.

10. Conclusion

In this study, websites for ministries' departments in India have been evaluated and ranked according to their WIFs (Simple, External and Internal). The website of DoFPD has the highest impact factor based on three selected WIFs i.e. Simple, External and Internal. The chosen websites have been also listed depending on their ranks identified by the tool Google Page Rank. The goal of this study is to provide accurate information on the websites of central government departments of India. It displays the visibility, effectiveness, and link quality of the concerned departmental websites. The results of this study will aid in the diagnosis of the issue and point us in the appropriate path for future study in the area of webometric evaluation.

References

Darem, A. A. M. (2013). Evaluation of the usability of e-government websites (doctoral dissertation). Retrieved from http://hdl.handle.net/10603/62244

Bhattacharya, D. (2014). Service quality of government websites in India: a select study (doctoral dissertation). Retrieved from http://hdl.handle.net/10603/110081

Brooks, L., & Persaud, A. (2015). Comparing local e-government websites in Canada and the UK. In *International Conference on Electronic Government* (pp. 291-304). Springer, Cham. Retrieved from https://scholar.google.co.in/scholar?hl=en&as_sdt=0%2C5&q=Comparing+Locale-GovernmentWebsitesinCanadaand+the+UK&btnG=

Chand, B. B. & Ramesha (2017). Indian government websites: a study. *DESIDOC Journal of Library & Information Technology,* 37(5), 346-352.

Hadagali, G. S., Bulla, S. D., & Shettar, I. M. (2021). Indian Institutes of Technology's websites in India: a webometric analysis. *Journal of Indian Library Association,* 57 (4), 143-154.

Verma, M. K., & Brahma, K. (2017). A webometric analysis of selected non-profit organizations (NGOS) of Assam. *KIIT J. Lib. Info. Manag,* 4(1), 63-72. Retrieved from https://www.researchgate.net/publication/314065883